

## Bradford Cornell

### Expert Witness

Numerous cases involving the application of financial economics

### Media Experience

Occasional author for the *Wall Street Journal* and the *Los Angeles Times*

Occasional commentator for local television and radio stations

Lecturer on valuation theory, appraisal practice and securities pricing

### Books

Cornell, B., 1996, **Social Decoding and Ethnic Discrimination**, revising draft for possible publication by the University of Chicago Press.

Cornell, B., 1994, **Corporate Valuation**, in *Handbook of Modern Finance*, Third Edition, Dennis Logue ed., Warren Gorham Lamont., Boston, MA.

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### Academic Articles

Cornell, B. and A.E. Bernardo, 1996, **The Valuation of Complex Derivatives by Major Investment Firms: Empirical Evidence**, *Journal of Finance*, (forthcoming)

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### **Book Reviews and Discussion Comments**

Cornell, B., 1988, **Statistical Analysis of Price and Basis Behavior: October 12-26, 1987**, in The Stock Market: Bubbles, Volatility, and Chaos, Eds., E.D. Dwyer and R.A. Hafer, Kluwer Academic Publishers, 1990.

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### **Working Papers**

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Cornell, B., 1984, **Testing the Tax Timing Option Theory: A New Approach**.

Cornell, B. and J.K. Dietrich, 1979, **Determinants of Corporate Capital Structure: An Empirical Analysis**.

### **Awards and Honors**

Cited as one of the ten most prolific research authors in the field of finance, in **Most Frequent Contributors To The Finance Literature**, by Jean Louis Heck and Phillip L. Cooley, *Financial Management*, Autumn, 1980.

Financial Management Association Prize for Applied Research: 1987

Institute for Quantitative Research in Finance, Research Grant: 1984

Center for the Study of Futures Markets, Research Grant: 1983

Center for the Study of Futures Markets, Research Grant: 1981

Chicago Mercantile Exchange, Research Grant: 1979

Phi Beta Kappa, Stanford University, 1970

Graduated with distinction, Stanford University, 1970

**DECLARATION**

I, Bradford Cornell, declare under penalty of perjury that the foregoing is true and correct. Executed on February 13, 1997.

Bradford Cornell





# MiCRA

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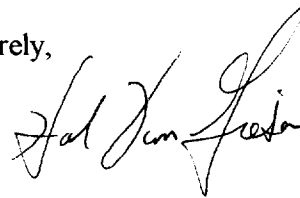
February 14, 1996

Mr. Jim Young  
Sidley & Austin  
1722 Eye Street, N.W.  
Washington, D.C. 20006

Dear Mr. Young:

Please find enclosed a hard copy and a diskette of Frederick R. Warren-Boulton's affidavit for AT&T. Please give me a call as soon as you receive this. Thank you.

Sincerely,

A handwritten signature in cursive script, appearing to read "Hal Van Gieson".

Hal Van Gieson

Enclosure

hvg/tc

## **Economic Analysis and Rebuttal of LEC Claims of a Depreciation Shortfall**

Frederick R. Warren-Boulton

This paper addresses the comments filed by the LECs regarding underdepreciation of LECs' assets due to differences between economic and regulatory measures of depreciation. Upon close examination, I find that LEC estimates of a large depreciation shortfall are unconvincing because they are based on flawed assumptions and misleading comparisons. LEC arguments that the failure to incorporate this alleged depreciation shortfall into the price of exchange access and unbundled network elements (UNEs) will have deleterious effects on investment and competition are also shown to be false. Moreover, I show that the depreciation shortfall claimed by the LECs is a product of LECs' plans to provide new, non-POTS type services, such as broadband. They do not claim the existing network is obsolete for its current services. Rather they assert the network is obsolete because it can't provide other services they want to sell. Under these circumstances, incorporating the depreciation shortfall into exchange access prices would provide a windfall for LECs' shareholders but have harmful effects on competition, prices, and investment in the telecommunications industry.

To determine how well regulatory depreciation practices are performing, it is necessary to have a benchmark for what depreciation reserves should be at a given point in time. The theoretical reserve is one such benchmark. Based upon current estimates of asset lives and net salvage rates, the theoretical reserve measures what depreciation reserves would be if current asset lives and net salvage rates had been used throughout time. If the book depreciation reserve is less (more) than the theoretical reserve, then there is a reserve deficit (reserve surplus).

Both MiCRA and the LECs have conducted studies to estimate the magnitude of the reserve deficit problem. Whereas MiCRA has estimated that the depreciation shortfall is very small and has been declining over time, the LECs have estimated that the depreciation shortfall is enormous and growing.<sup>1,2</sup> What explains the large difference between these two sets of estimates? The central difference between these two estimates is that MiCRA's estimates were based on the prescribed lives and net salvage values filed

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<sup>1</sup>For the LECs' estimate of the depreciation shortfall, see Jeffery Rohlf, Charles Jackson, and Ross Richardson. *The Depreciation Shortfall*. USTA Comments, CC Docket No. 96-262 (January 29, 1997), Attachment 15, p. 7.

<sup>2</sup> For MiCRA's estimate of the depreciation shortfall, see Kenneth Baseman and Harold Van Gieson. *Depreciation Policy in the Telecommunications Industry: Implications for Cost Recovery by the Local Exchange Carriers*. Prepared on behalf of MCI Telecommunications Corporation, December, 1995.

by the LECs in their most recent depreciation represcription, whereas the LECs' new estimates of the depreciation shortfall are based upon their new estimates of "economic" lives and net salvage rates, which are far shorter than the lives they proposed just a couple of years ago.<sup>3</sup>

The LECs do discuss in some detail the principles which in their view determine the "economic" life of an asset. It is not these principles that are problematic, but the LECs misapplication of them to the analysis of the alleged depreciation reserve shortfall. SWBT's depreciation expert, John Lube, states that the economic life of an asset is primarily determined by "technology, competition, and customers' demand for new services."<sup>4</sup> These are the same three drivers cited by TFI's Poitras and Vanston in their Appendix B.<sup>5</sup>

The first of these factors, technology, can influence economic life through the introduction of new, superior technology that reduces an asset's value, i.e. via economic obsolescence.<sup>6,7</sup> This naturally raises the question of why there should be a large difference between LEC and regulator estimates of the impact of technology obsolescence since regulators are aware of this problem and have taken steps to make their depreciation practices more forward looking.<sup>8</sup> MiCRA's earlier depreciation study examined this question indirectly. By looking at the source of the difference between company proposed and FCC prescribed depreciation lives in 1995, it was possible to determine that the largest difference (in terms of its impact on the reserve deficit) was in subscriber metallic cable. Why would the LECs want to replace most of their subscriber metallic cable? TFI's studies of technological substitution in the telephone industry provide the answer. TFI predicts that the vast majority of this cable will be replaced rapidly by Fiber in the Loop to enable LECs to supply their customers with new services, such as video on demand.<sup>9</sup> More generally, Poitras and Vanston argue that "projections for new services

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<sup>3</sup>In his Reply Affidavit, Richard Lee has shown that the LECs have incorrectly used financial reporting lives in deriving their alleged reserve deficiency. He demonstrates that with appropriately calculated asset lives, there is no reserve deficiency. See *Reply Affidavit of Richard Lee*, attached to AT&T Reply Comments, CC Docket No. 96-262 (2/17/97).

<sup>4</sup>John Lube. "Economic Analysis of Depreciation Catch-up Issues." Comments of SWBT, CC Docket 96-262 (1/29/97). Appendix 2, p.1.

<sup>5</sup>Adrian Poitras and Lawrence Vanston. "Implications of Technology Change and Competition on the Local Exchange Carriers." USTA comments, CC Docket No. 96-262 (1/29/97), p. 2.

<sup>6</sup>Lube also defines economic obsolescence to include the decline in an asset's value due to competition (Lube, CC Docket 96-262, p.2.). This error shows a confusion between the effects of technological change and of competition on asset values, which are distinct and separate factors.

<sup>7</sup>The introduction of new technology can also influence an asset's value by extending its economic life, e.g. the application of ADSL broadband technology extending the life of copper distribution plant. See discussion in Krafvtin, Selwyn and Laszlo's "Reply Affidavit attached to AT&T's Reply Comments," CC Docket No. 96-262 (2/14/97), p. 24 ff.

<sup>8</sup>For example, see *Report on Telephone Industry Depreciation, Tax, and Capital/Expense Policy*, Accounting and Audits Division, Federal Communications Commission, April 15, 1987, p. 8.

<sup>9</sup>Lawrence Vanston. *Transforming the Local Exchange Network*. Technology Futures Inc, 1994.

demand show that a ubiquitous broad band digital network will be needed by the LECs in the 2010-2015 time frame".<sup>10</sup> Thus, it appears that the LEC experts link the first and third factors in their minds. But they should not be linked.

What economic justification would there be for LECs to prematurely retire their current plant that is adequate to provide basic local service so that they can offer new, advanced services? Poitras and Vanston claim that "As technology and services have evolved, each generation of customers has paid for the on-going cost of network improvements that have increased quality and decreased prices."<sup>11</sup> In the past, this rationale could have been justified because local phone service was a monopoly and today's and tomorrow's customers were both regulated, and largely even the same customers, so that this was in effect a transfer from today's customers to tomorrow's customers. However, as USTA has pointed out, in the future LEC prices will be set by competition rather than regulation. Hence, today's POTS customers would be paying part of the costs of investment required for new non-basic services in the future. Yet in the future, competitive pressures will force prices to their competitive level, where price equals cost, which includes all capital costs. Thus, they would be transferring wealth not from themselves to other customers in the future, but rather to LEC shareholders.

For purposes of estimating cost-based prices for exchange access, UNEs, and basic telephone services, economic lives should be based on the economic life of telecommunications plant used to provide basic local service. Basing economic lives on the desire by LECs to provide new, advanced services is inappropriate. As will be illustrated below, to do so would be nothing more than a transfer from current ratepayers to LEC shareholders. Moreover, by overstating the true level of depreciation expense, it would artificially raise the price of exchange access and UNEs and lead to higher prices at the retail level. However, contrary to the claims of Poitras and Vanston, MiCRA's earlier study did not argue that LECs should not be allowed into these new services.<sup>12</sup> The point here is merely that the costs of these premature retirements should be assigned to the new services which necessitate those retirements, and not to customers of regulated telecommunications services.<sup>13</sup>

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<sup>10</sup>Adrian Poitras and Lawrence Vanston. "Implications of Technology Change and Competition on the Local Exchange Carriers." USTA comments, CC Docket No. 96-262 (1/29/97), p.ii.

<sup>11</sup>Adrian Poitras and Lawrence Vanston. "Implications of Technology Change and Competition on the Local Exchange Carriers." USTA comments, CC Docket No. 96-262 (1/29/97), p. 14.

<sup>12</sup>Adrian Poitras and Lawrence Vanston. "Implications of Technology Change and Competition on the Local Exchange Carriers." USTA comments, CC Docket No. 96-262 (1/29/97), p. 15.

<sup>13</sup>This argument is especially applicable to SNET's claim that higher depreciation is required due to the replacement of its copper cables with HFC for CATV and broadband to the home. See SNET comments, CC Docket No. 96-296 (1/19/97).

Example of How LEC Premature Retirements Can Create a Spurious  
“Depreciation Shortfall” Under the LECs Proposed Depreciation Methods

The numerical example below is constructed to illustrate how the LEC approach to depreciation is simply a ruse to get regulators to bless cross-subsidy. Under the LECs’ approach to the problem, if they can’t force basic ratepayers to subsidize their entry into other services, they label this “problem” a depreciation shortfall.

We consider three alternatives.

(A) is a stand-alone network that provides only POTS service. To avoid contributing to a cross subsidy, POTS consumers should not have to pay more than the total costs over time of this network. This network is assumed to have a useful life of ten years. In particular, we assume that if the firm remains only a seller of POTS, it would regard a regulated prescribed life of ten years as perfectly reasonable. The POTS network is not obsolete for POTS.

(B) is a stand-alone broadband network (for example, a cable system). It also has a useful life of ten years.

(C) is a POTS plus broadband network built by the LEC after the fifth year. This captures the notion that a firm might want to “prematurely” retire a network in order to provide additional service the old network cannot offer. If it is appropriate to build this network, part of the existing network must be “prematurely” retired. The new investment after the fifth year also has a ten year life. It is assumed that the LEC gets all the benefit of any economies of scope.

The example will illustrate that:

- i) TELRIC-based depreciation<sup>14</sup> schedules that are subsidy-free will provide the firm with the appropriate signals for whether to choose option C (“prematurely” replacing the POTS network) over option A (not replacing the POTS network and waiting an additional five years to provide broadband services).<sup>15</sup>
- ii) These depreciation schedules do not burden basic ratepayers with any of the costs associated with the retiring of the POTS network early. If it makes sense to retire the POTS network early, it can only be because the incremental revenues associated with the new services more than cover the incremental costs.

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<sup>14</sup>Under the FCC’s TELRIC principles, TELRIC can be calculated for networks providing only a certain set of services, such as narrowband, or POTS services. This is the same as the stand alone costs of that network. If TELRIC were calculated for adding POTS services to an existing broadband network, the TELRICs would be lower.

<sup>15</sup>It is a feature of the example that so long as broadband service has any incremental value, a broadband network will be built. The only question is when.

iii) Since all the increase in net value due to entry into new services goes to the LEC, the LEC's shareholders keep all the increase in value from selling the new services. To the extent there are economies of scope between POTS and broadband services, this implies that basic ratepayers get none of the benefit from the scope economies. Thus, contrary to the LECs' claims that proper TELRIC depreciation will unfairly or inefficiently harm them in their zeal to become entrepreneurs, in fact the basic ratepayers get none of the gains from trade where LEC entry is warranted and where economies of scope are realized.

In contrast and using the Vanston, et al., methodologies,

- i) POTS customers suffer due to LEC entry into broad band services that is profitable under the LECs proposals but unprofitable under the proper TELRIC-based depreciation schedules.
- ii) The gain to the LEC from entry is greater than the increase in the net value.
- iii) LECs will enter broadband services even if it would not be efficient (i.e., if incremental revenue is less than incremental cost).
- iv) POTS customers would be subsidizing LEC entry into broadband services by the amount of the excessive depreciation.
- v) A large "depreciation shortfall" appears to be present when entry into broadband services is cross-subsidized.

To keep things simple, I assume all three alternatives have the same variable costs (200/yr) and amount of capital investment (1000), and serve 400 customers ( $Q=400$ ) with either POTS, broadband (BB) or both together. For a monopoly POTS network, the cost of capital is 10%, for an unregulated broadband services network, the cost of capital is 12%, and for a combined network the cost of capital is the midpoint of 11%. The LECs plan (the "actual" network, in the LECs terminology) is assumed to be to get into the broadband services business in five years. This will require replacing 500 of their 1000 in capital (e.g., copper cable) with new equipment (e.g., fiber) after it has been in service for only 5 years.

	(A) POTS	(B) Broadband services	(C) POTS+Broadband services
quantity/yr.	400	400	400
Capital stock.	1000	1000	1000
variable costs/yr.	200	200	200
capital recovery rate <sup>16</sup>	0.10	0.12	0.10 for the first 5 years 0.11 for the second five years
capital costs/yr.	100	120	100 for first five years 110 for second five years
SL depreciation/yr.	100	100	150 for first five years 100 for second five years
Total Costs/yr.	400	420	450 for first five years 410 for second five years.

The entries are fairly self explanatory, with the exception of the SL (straight-line) depreciation row. The values for columns A and B are simply the ten-year straight-line depreciation values for the \$1000 investment. The values in column C, however, reflect the LEC proposals. That is, the LECs have a “real” network plan to replace one-half of the copper network with broadband capability at the end of year 5. As a result, for the initial \$1000 copper network, one-half will be retired early. For that \$500 of investment, the LECs propose to depreciate at \$100 per year since the asset will be removed from service after five years. For the \$500 of copper that remains in service over all ten years, the annual depreciation is \$50. Annual depreciation in the first five years is thus \$150. In the second five years, annual depreciation is \$100, reflecting straight-line ten year depreciation of two different \$500 investments (\$500 of “ten year” copper invested in year 1 and \$500 of broadband capable investment at the end of year 5).

The incremental costs of broadband services are thus \$50/yr for the first five years (before the LEC even gets into broadband services) due to premature retirements, plus \$10/yr for each year after the first five because of higher capital costs due to entry into a competitive market, for a total of \$300 over ten years.

Now consider what happens under economic depreciation principles (“TELRIC”) versus the LEC proposed rules.

Under TELRIC, the maximum amount that can be collected from consumers of regulated services is \$400/yr. If incremental revenues from broadband services in the second five years are equal to the standalone cost of \$420/yr, the LEC makes a profit of \$1800

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<sup>16</sup>These capital recovery rates are chosen for simplicity. They are probably too high. For example, if the cost of capital is 10% and investments are straight-line depreciated over ten years, then (ignoring taxes) total required capital recovery is 16.3% annually. The table shows an annual capital recovery rate of 20%.

( $420 \times 5 - 300$ ) over the initial ten years. For each year after the initial ten years, the LEC makes \$420 from broadband participation (total revenues are \$820 and total costs are \$410). This is a bargain for the LEC. On a stand-alone basis broadband services are just a break-even proposition, yet because it captures all the economies of scope, providing broadband services is enormously profitable for the LEC.

If incremental revenues from broadband services are less than \$60 per year in years 6 through 10, the LEC cannot afford to enter broadband services in year five, which is as it should be. The incremental profits are negative. Instead, the LEC waits five years until its original POTS-sufficient capital is fully depreciated, and then replaces that capital with broadband services-capable equipment.

In contrast, the LECs claim that since it is known that one-half the copper will be retired short of its useful life, a depreciation shortfall today of \$250 has been created. This is the extra \$50 annual depreciation in the first five years “necessary to recover” the cost of the copper that will be retired early. If that shortfall is recovered from basic ratepayers over the first five years, then entry into broadband services is privately profitable for the LEC as long as the “losses” do not exceed \$190 per year from broadband services in years 6 through 10. In addition, if the LEC is allowed to charge its basic ratepayers a blended higher cost of capital because of its entry into unregulated markets, they will claim the right to recover an additional \$10 per year in years 6 to 10. The LECs end up labeling the entire \$300 of incremental costs from entering broadband services at the end of year five<sup>17</sup> as either a depreciation shortfall or a competition-induced increase in the cost of capital.

The basic problem with the LEC depreciation proposals is that they do not follow from a reasonable theoretical benchmark. In order to be subsidy-free, broadband services revenues must cover incremental costs. If they do not, then the investment timing (as proposed by the LECs) is inappropriate. But Vanston, et. al., proceed by bootstrap arguments. They assert that it is optimal or necessary that the “actual” network be replaced soon, and then back out the amount of underdepreciation in the system. But assuming the network is not obsolete for the provision of POTS, this is a completely vacuous exercise. In that case, the costs of truncating asset lives to provide new services are part of the incremental cost of the new services.

The second of these three factors, competition, is treated improperly by the LECs. Although LECs will face competition in the downstream market for local exchange services, they are unlikely in the near term to face significant competition in the upstream market for provisions of network elements. Because of significant economies of scale and the high proportion of sunk costs involved in the production of many network elements, local exchange carriers will continue to have significant market (even monopoly) power in the

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<sup>17</sup> From the bottom row of the table, one can calculate the total (undiscounted) incremental costs of providing broadband services. It is \$50 for the first five years and \$10 for the next five years.



provision of these elements. Therefore, it is unclear that competition will significantly affect the economic life of LEC assets, at least for the foreseeable future.

As support for their choice of shorter economic lives in calculating the depreciation shortfall, the LECs propose several benchmarks to validate their estimates. We briefly critique several of these benchmarks. In general, the use of these benchmarks is inappropriate or misleading. Moreover, the LECs are not always very consistent in their treatment of these benchmarks.

The first proposed benchmark is the financial lives reported by the LECs on their financial reports. As Poitras and Vanston have noted, in the last few years most LECs have discontinued FAS 71 accounting for financial reporting purposes.<sup>18</sup> Lube asserts (incorrectly) that the economic lives used by the LECs in computing the depreciation shortfall should be consistent with the lives they use for financial reporting.<sup>19</sup> However, the depreciation lives from financial reports will understate true economic lives because they are governed by the Generally Accepted Accounting Principle (GAAP) of "conservatism." Although GAAP protects the interests of shareholders, it does not protect rateholders from excessive depreciation expense due to understating of asset lives on LEC financial reports.<sup>20</sup> Moreover, whereas it might be appropriate for financial reporting purposes to use asset lives based on premature retirement of plant to provide new, non-POTS services, it would be inappropriate to base asset lives (and hence depreciation rates) for basic local service on those financial lives. Finally, it appears that the consistency claimed by Lube between LEC economic lives for TELRIC purposes and for financial purposes is not always apparent.<sup>21</sup>

The second proposed benchmark is the asset lives of IXC and CATV operators. It is hardly informative, however, to look at firms that are either in different industries or face quite different competitive conditions. As it was discussed above, in the downstream retail market, there will eventually be substantial competition between IXCs and LECs. In the upstream market for UNEs, nonetheless, the LECs are likely to retain a substantial degree of market power in the near future. As described in detail in the Lee Affidavit, the use of plant by LECs to provide local exchange and exchange access service is much different than the use of plant

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<sup>18</sup>Adrian Poitras and Lawrence Vanston. "Implications of Technology Change and Competition on the Local Exchange Carriers." USTA comments, CC Docket No. 96-262 (1/29/97), p. 6.

<sup>19</sup>John Lube. "Economic Analysis of Depreciation Catch-up Issues." Comments of SWBT, CC Docket 96-262 (1/29/97). Appendix 2, p.4.

<sup>20</sup>This point was also stated by the FCC in Prescription Simplification (1993). Richard Lee also demonstrated in his Reply Affidavit that the LECs have incorrectly used financial reporting lives in deriving their alleged reserve deficiency. He shows that appropriately calculated theoretical reserve studies do not indicate a reserve deficiency. See *Reply Affidavit of Richard Lee*, attached to AT&T Reply Comments, CC Docket No. 96-262 (2/17/97).

<sup>21</sup>For example, in Arkansas SWBT's financial lives were higher than its proposed economic lives for TELRIC purposes by 22% for digital switches and by 23% for digital circuits. See Frederick Warren-Boulton. Rebuttal Testimony on Behalf of AT&T Communications of the Southwest. Arkansas Docket No. 96-395-U, p. 11.

by IXC's and CATV operators.<sup>22</sup>

The third proposed benchmark is replacement cost as proxied by the Hatfield Model.<sup>23</sup> First, it should be pointed out that Rohlfs, et al's, comparison of the gross investment generated by the Hatfield model (\$113 billion) with the gross book investment by LECs (\$235 billion) is meaningless since much of the LEC plant has already been depreciated. The more appropriate comparison is the net book value of LEC plant (approximately \$115 billion), which is quite close to the Hatfield model's estimate. This should not be entirely surprising as for important classes of LEC plant, such as outside plant, the replacement cost has been increasing over time relative to the net plant of embedded facilities. Even this comparison is flawed, however, since the Hatfield Model does not estimate investment needed in order to provide all of the LECs' services included in their existing net book investment. Second, Rohlfs, et al. assertion that the Hatfield model provides "devalued investment" is simply wrong.<sup>24</sup> The Hatfield model does not do this.

Even though the evidence of a depreciation shortfall is not very compelling, the LECs have argued that "Unless the capital-recovery problem is addressed, investors cannot be expected to continue investing on the same terms as the past."<sup>25</sup> This statement is inconsistent with actual investor behavior. For the RBOCs the ratio of their market value to their book value has been increasing from approximately 0.9 in 1984 to about 2.5 in 1996 even after adjusting for SFAS 71 writeoffs.<sup>26</sup> If investors perceived a serious depreciation shortfall, we would not observe market to book values so high. Moreover, because the market to book ratio for the LECs were considerably above 1.0 for most of this 13 year period, it indicates that contrary to LEC claims, the LECs have been consistently earning more than their cost of capital, and there is no evidence that LEC shareholders have been shortchanged by regulators' depreciation practices over this time period.

Alternatively, the LECs have argued that the depreciation shortfall "should not be a shareholder risk."<sup>27</sup> Of course, this ignores the risk to rateholders from premature retirement of LEC assets. If LECs were so concerned about the risk of underdepreciation, why did they accept price caps in the first place? They must have known that under any form of pure price

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<sup>22</sup>See *Reply Affidavit of Richard Lee*, attached to AT&T Reply Comments, CC Docket No. 96-262 (2/17/97).

<sup>23</sup>Jeffery Rohlfs, Charles Jackson, and Ross Richardson. *The Depreciation Shortfall*. USTA Comments, CC Docket No. 96-262 (January 29, 1997), Attachment 15, p. 24.

<sup>24</sup>Jeffery Rohlfs, Charles Jackson, and Ross Richardson. *The Depreciation Shortfall*. USTA Comments, CC Docket No. 96-262 (January 29, 1997), Attachment 15, p. 23-24.

<sup>25</sup>Jeffery Rohlfs, Charles Jackson, and Ross Richardson. *The Depreciation Shortfall*. USTA Comments, CC Docket No. 96-262 (January 29, 1997), Attachment 15, p. 5.

<sup>26</sup>Patricia Kravtin and Lee Selwyn. "Assessing Incumbent LEC Claims to Special Revenue Recovery Mechanisms." CC Docket No. 96-262, Table C2.

<sup>27</sup>John Lube. "Economic Analysis of Depreciation Catch-up Issues." Comments of SWBT, CC Docket 96-262 (1/29/97). Appendix 2, p.3.

caps, depreciation would be endogenous.

And in conclusion, it is ironic that the LECs, who fought so hard for the passage of the Telecommunications Act of 1996, and in which they both won and lost some issues, now want to claim that on the issues they traded away they were unfairly treated. As Kravtin and Selwyn have shown, the Telecommunications Act provided the LECs with a number of new sources of revenues. Moreover, the LECs may expect to make a substantial amount providing services that only they could economically provide because they have been the POTS provider (i.e. they get to keep the economies of scope.) Thus, the LECs are ignoring the tradeoffs inherent in any legislation.

Because embedded costs are sunk by definition, and since even most of the LECs' capital base over the foreseeable future is largely in place and sunk, it should be clear that, in arguing for recovery of past "underdepreciation" or for prices for access elements and UNEs that would reflect "economic depreciation" based on the LECs' own forward-looking plans (as opposed to depreciation that would be anticipated for an efficient POTS-only network), the LECs are making a legal or equity argument, not an economic argument.

I do not comment here on the non-economic merits of their arguments. I conclude that the economic arguments the LECs and USTA have put forth regarding "underdepreciation" are unsound and must be rejected. The policies they propose would allow them to force basic ratepayers to cross-subsidize their efforts to provide services other than basic telephony. They are literally asking the Commission to give them, in the guise of depreciation "reform", a license to steal. TELRIC-based depreciation provides the LECs with the appropriate signals for investing to provide new services, and offers a more than adequate reward for such investments if they are warranted.

**DECLARATION**

I, Frederick R. Warren-Boulton, declare under penalty of perjury that the foregoing is true and correct. Executed on February 14<sup>th</sup> 1997.

A handwritten signature in black ink, appearing to read "Frederick R. Warren-Boulton", is written over a horizontal line.



**Statement of Dr. John R. Norsworthy<sup>1</sup>**

**RESPONSE TO CHRISTENSEN'S ASSOCIATES'  
"CRITIQUE OF AT&T PERFORMANCE-BASED MODEL"  
AND TO STRATEGIC POLICY RESEARCH'S  
"THE DEPRECIATION SHORTFALL"**

Appended to the USTA Comments in the FCC's Access Charge Reform proceeding, CC Docket No. 96-262, are two attachments containing criticisms and comments on the methods followed in the Performance-Based Model, submitted in the LEC Price Cap Performance Review (X-Factor) proceeding, CC Docket No. 94-1. These two attachments are: the "Critique of AT&T Performance-Based Model," by Christensen Associates, and "The Depreciation Shortfall" by Strategic Policy Research. I deal with both of these papers in this Statement.

1. The major part of this Statement responds to matters raised by Christensen Associates in its "critique" of the Performance-Based Model ("PBM"). In its paper Christensen Associates offers several arguments allegedly criticizing the PBM. They address (i) the PBM's separate estimate of interstate total factor productivity ("TFP"), (ii) its allocation of capital costs, (iii) its extrapolation of data within the 1985-1994 period, and (iv) several methodological practices embodied in the PBM's calculations. On this basis, Christensen Associates takes

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<sup>1</sup> Dr. Norsworthy authored and co-authored statements in the LEC Price Cap Performance Review (X-Factor) proceeding before the Commission (CC Docket No. 94-1), and his background and qualifications have been set forth in attachments to AT&T's Comments filed therein.

exception to AT&T's showing that a substantially higher X-Factor should be attributed to the LECs' interstate access services.

In response, this Statement demonstrates that Christensen Associates' main arguments are unjustified. Among other things, the Christensen Associates' paper (a) deliberately ignores the vast difference between interstate TFP and TFP for all the LECs' regulated services, (b) improperly seeks to shift the discussion of Christensen Associates' misstatement of the capital share in its TFP calculation to one concerning the relationship between total revenues and total cost, and (c) implicitly criticizes procedures used in Christensen Associates' own calculations, including, inter alia, interpolation and measurement-by-proxy methods applied in its own model (the "Simplified Christensen Model") previously presented to the FCC. Finally, this Statement presents updated productivity and X-Factor data for the 1985-1995 period; these more recent data show clearly that the X-Factor for use in the price cap formula for the LECs' interstate access services recommended by AT&T is indeed a moderate one, based on the LECs' productivity performances and their recent actions electing higher productivity improvement targets than are consistent with the Christensen Associates' account of their productivity potential.

2. In the last few pages of this Statement, I respond to the paper by Strategic Policy Research ("SPR") discussing a potential "shortfall" of FCC-allowed depreciation from economic depreciation. As part of its analysis, SPR cites the quality adjustment factor, applied in AT&T's Comments in Docket 94-1 to support SPR's contention that the LECs' capital stocks are inadequately depreciated under the depreciation rules established by the Commission. In response

to SPR, this Statement demonstrates that the quality factor is not appropriate to be used as SPR has done in its paper.

## **I. RESPONSE TO CHRISTENSEN ASSOCIATES**

In this response, it is difficult to assess the quantitative details and effects of many of Christensen Associates' assertions because its latest spreadsheets, which have been made available, calculate productivity only through the year 1993. Consequently, Christensen Associates' references to data years 1994 and 1995 cannot be assessed completely. This is especially true of the labor adjustment accounted in line 11 of Table 1 and line 4 of Table 2 of the Christensen Associates critique. Further, whereas the PBM bases its calculations on the period 1985-1995 (earlier results were based on 1985-1994), Christensen Associates' critique applies only to the period since 1988. The PBM conforms to the Commission's dictum that the relevant period for determining the performance of the LECs is 1985 forward. We are therefore at a loss to guess what the effects of the Christensen Associates' comments would be if they were applied to the entire period of the Performance-Based Model calculations. The Christensen Associates' analysis is unenlightening on this important point. Indeed, what Christensen Associates has really done is to show the effects of including the PBM assumptions in the Simplified Christensen Model ("SCM") rather than the effects of the SCM assumptions on the PBM.

Further questions are raised by the Christensen Associates analysis because the effects in Table 1 of its critique, taken from the quantity side of the TFP analysis, are not always balanced by effects of the same magnitude in Table 2, the price side of its analysis. At a minimum,



Christensen Associates should explain why the usual duality between price and quantity in TFP analysis does not hold in its analysis.

**A. Determination of TFP on an Interstate-Only Basis**

This element of the Christensen Associates critique is accounted in line 3, Table 1, p.30 of the Christensen Associates critique, attached to the USTA Comments. (Hereafter, such references to data in the Christensen Associates' critique will be abbreviated without citing the critique, for example, as "line 3, Table 1.") There are two levels of discussion of the interstate calculation of TFP: the practical and the academic. As demonstrated in the Norsworthy Statement and the Norsworthy-Berndt Reply Statement previously filed in the LEC X-Factor proceeding, the objective at a practical level is to construct a reasonable lower bound for TFP growth in the interstate services supplied by the LECs. *This practical objective differs in no way from the objective of the Simplified Christensen Model which relies on Commission-adopted procedures to allocate between unregulated and regulated services.* The objective from an academic/econometric perspective is to use an estimated multiple output model of production for the LECs and to test for separability of regulated from unregulated output (as in the Simplified Christensen Model) and for separability of interstate output from other outputs (as in the Performance-Based Model). *This academic/econometric objective also differs in no way from that of the Simplified Christensen Model, which distinguishes between the LECs' unregulated and regulated services.* Both AT&T and USTA (Christensen Associates) have acknowledged the difficulty in estimating stable econometric models of production, and no such estimates have been presented for consideration in this proceeding or in the X-Factor proceeding. Thus, there is no